

a' developed to position such minute quantities in a small area using robotic equipment and ink jet delivery devices. Commonly-assigned co-pending Patent Application Serial No. 09/709,776 discloses alternative methods of positioning minute quantities of material in a small area on a biological array that are compatible with and complementary to robotic methods. One such method involves placing a contact mask over a substrate to conceal a portion of the substrate and leave a plurality of discontinuous portions of the substrate exposed. Such a mask has a plurality of holes through it. Each of the holes, together with the portion of the substrate surface which it overlies, forms a cavity. Biological and chemical materials can be deposited into each of the cavities individually using robotic equipment, or collectively by immersion in a solution, spraying, brushing or dropwise deposition using far less sophisticated and expensive equipment than is conventionally used to address individual elements of an array. PDMS has desirable adhesion, elasticity and strength properties and can be cast from a non-viscous precursor so that minute features like 50  $\mu\text{m}$  holes are transferred from a mold master to the PDMS. PDMS, however, is cytophilic, which is problematic for patterning cells, proteins and other biological materials in an array because these materials tend to adsorb onto the PDMS. In many applications for which bioarrays are suited, it is necessary to deposit material over the entire array or into a large group of adjacent cavities. Depositing material over a large contiguous portion of an array has potential cost savings in fabricating and using the array because these steps can be conducted without expensive and time consuming robotic manipulations. However, when large areas of the array are addressed collectively, it is detrimental to the process if the material adheres to the top surface of the contact mask instead of depositing into a cavity. In addition, material adsorbed by the PDMS in one patterning step may interfere or react with material being patterned in a subsequent step. The present invention provides a solution to this problem by providing a non-cytophilic patterning element, such as a contact mask, that has the desired properties of adhesion and elasticity (akin to those of PDMS) and acceptable tensile strength for use in patterning of biological and chemical materials on microarrays. =

Please replace the paragraph at page 13, line 18 to page 14, line 3 in the Detailed Description section with the following paragraph:

a2 —Patterning elements that may be made from hydrogels using the molding technique and apparatus described below include stamps, such as the PDMS stamps described

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in U.S. Patents Nos. 5,776,748; 5,512,131 and 5,900,160 and contact masks such as are described in commonly assigned, co-pending U.S. Patent Application Serial No. 09/709,776. Hydrogels that exhibit faithful elastic memory are well suited to both applications. For instance, a hydrogel stamp is a good patterning element for patterning aqueous solutions of biological materials onto a substrate. The hydrogels are especially well suited for use as contact masks in the patterning of biological materials upon a substrate and the invention will now be further described with reference to such patterning elements, their production and use. - -

Please replace the paragraph at page 14, line 19 to page 15, line 2 in the Detailed Description section with the following paragraph:

A<sup>3</sup>  
→Holes or cavities in the contact mask or diffusion mask, respectively, may have any desired shape. Holes and cavities preferably have a cross-sectional area of approximately 1  $\mu\text{m}^2$  to several  $\text{mm}^2$ . In masking techniques disclosed in commonly-owned co-pending U.S. Application Serial No. 09/709,776 multiple masks are used to pattern multiple biological and chemical materials. In such techniques, the size and shapes of the holes may vary from one mask to another and holes of various sizes and shapes may be present on the same mask. —

In the Claims:

Please amend claims 1-3, 5, 9, 14 and 15, and add new claims 53-66 as follows:

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B.7  
1. (Amended) A patterning transfer element comprising a polymer gel for patterning biological materials.

A<sup>4</sup>  
2. (Amended) A contact mask comprising a polymer gel.

3. (Amended) The polymer gel contact mask of claim 2<sup>5</sup> wherein the polymer gel is a hydrogel.

A<sup>5</sup>  
4. (Amended) The polymer gel contact mask of claim 3<sup>7</sup> wherein the polymer chains are a homopolymer of HEMA crosslinked with a crosslinking agent.